

Appl. No.: 10/731,951
Amdt. dated 12/19/2005
Reply to Office action of 09/28/2005

REMARKS/ARGUMENTS

In the Office Action dated September 28, 2005, Claims 1-40 are pending, of which Claims 7-40 have been withdrawn and are cancelled above. Claims 1, 2, 4, and 5 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,422,434 to Statz, et al. Claims 1, 2, and 4-6 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,171,695 to Sletten. Claims 1-5 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 1,683,266 to Shipman.

Claims 1 and 4 are amended above, and new Claims 41-51 are added. Reconsideration of the rejections is requested in light of the following comments.

Claim 1 is directed to an apparatus for collecting solar energy. The apparatus includes a receiver extending along an axis and defining a passage for receiving a heat transfer fluid, an optical lens, and a concave mirror. The lens is configured to direct solar radiation to the receiver, and the mirror is configured to reflect solar radiation toward the receiver. The solar radiation reflected by the mirror does not pass through the lens. Thus, "the mirror and lens are configured to direct different amounts of solar radiation toward the receiver and thereby heat the receiver at first and second rates, respectively, during similar solar conditions." For example, Figures 6 and 7 illustrate an exemplary apparatus 100 in first and second positions. In the first position, the lens 140 is adjusted to a stowed position so that the mirror 110 is configured to receive solar radiation from the sun, without the solar radiation passing through the lens 140, and the mirror 110 directs the radiation to the receiver 102 to heat the receiver at a first rate. In the second position, the lens 140 is adjusted relative to the mirror 110 to an extended position, e.g., by a motor 120, so that the lens 140 directs solar radiation onto the receiver 102, e.g., directly from the lens to the receiver. Thus, according to Claim 1 as amended, the apparatus can heat the receiver (a) at a first rate by reflecting solar radiation to the receiver with the mirror and independent of the lens, or (b) at a second rate by directing radiation toward the receiver with the lens. As described in the application, these two different rates can be selectively used. For example, the greater rate of heating can be used to heat fluid in the receiver for power generation, and the lower rate can be used to preheat an empty receiver or to thaw solidified fluid in the receiver.

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None of the cited references discloses an apparatus with a lens and a mirror that can independently heat a receiver at different rates, i.e., with the mirror configured to reflect solar radiation that does not pass through the lens so that the receiver can be selectively heated at a lower or higher rate during similar solar conditions. For example, Statz, et al. describes a solar energy collection apparatus in which a lens directs solar energy onto an energy receiving means and onto the inner surface of a spherical means. Unlike the present invention, all of the solar energy reflected by the inner surface of the spherical means first must pass through the lens. Thus, the lens and inner surface are used in combination to provide a total rate of heating and are not used selectively to provide independent rates of heating. In addition, Statz, et al. describes an energy receiving means that is located at the center of the spherical means, not a receiver that extends along an axis as claimed. Similarly, Sletten and Shipman also disclose devices in which all reflected energy must first pass through a lens, such that the lens and mirror cannot be used independently to provide selective rates of heating. In light of this distinction between Claim 1 and the cited references, Applicant respectfully submits that Claim 1 is allowable.

Claims 2-6, 41, and 42 depend from Claim 1 and are also therefore allowable for the foregoing reasons. In addition, these dependent claims provide additional bases of distinction over the cited references. For example, Claim 4 as amended recites that "the lens is adjustably supported relative to the mirror." This feature can be seen, e.g., in Figures 6 and 7, which illustrate the extension and retraction of the lens as described above. The cited references do not disclose such adjustment of the lens relative to the mirror and therefore do not teach that the lens is adjustably supported in this manner. To the contrary, the cited references disclose that the lens and mirrors are used in combination and specifically teach away from adjustment therebetween. For example, Statz, et al. and Sletten teach away from any adjustment. See Statz, et al. at col. 1, lines 61-64 ("Another of the principal objects of this invention is to provide a solar energy collection apparatus which will maintain a reasonable orientation with the sun without having to mechanically adjust its orientation."); Sletten at col. 1, lines 21-25 ("However, the complication of moving and pointing mirrors or lenses have rendered tracking concentrators economically impractical for domestic heating and electrical power generation at homes or other consumer locations."). Shipman discloses a particular orientation of each reflector to each lens and specifically notes that the lenses are secured to a frame 10 within which the reflectors are also

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“fixedly mounted.” Shipman at page 1, lines 5-15. Thus, the cited references do not teach the adjustable support that is recited in Claim 2. Similarly, the cited references fail to disclose “a drive mechanism for adjusting the lens relative to the mirror,” a feature recited in Claim 41. Claim 42 recites that “the mirror is configured to direct a greater amount of solar radiation toward the receiver than the lens during similar solar conditions,” a feature further described in the specification for selectively providing a relatively greater rate of heating with the mirror 110 or a relatively lesser rate of heating with the lens 140. See page 8, lines 21-26.

Newly added independent Claim 43 is also directed to an apparatus for collecting solar energy. Similar to Claim 1, the apparatus includes a receiver extending along an axis, a concave mirror, and an optical lens. At least one of the mirror and lens is adjustably supported and thereby configured to adjust between first and second positions. In the first position, the mirror is “configured to receive a first amount of solar radiation not passing through the lens and direct the solar radiation toward the receiver.” See Figure 6. In the second position, the lens is “configured to direct a second amount of solar radiation toward the receiver.” See Figure 7. The first and second amounts of solar radiation are “different such that the mirror and lens are adapted to selectively heat the receiver at first and second rates during similar solar conditions.” For example, as described in the present application, “the apparatus can direct different amounts of solar radiation toward the receiver, thereby selectively heating the receiver at different rates during similar solar conditions, e.g., to preheat the empty receiver, to heat fluid in the receiver for power generation, or to thaw solidified fluid in the receiver.” Page 3, lines 8-12. As discussed above, the cited references fail to disclose an apparatus in which a mirror or lens can be adjusted so that the mirror and lens can be selectively used to provide two different rates of heating, i.e., a first rate provided by the lens, and a second rate provided by the mirror, which receives light not passing through the lens. Accordingly, Claim 43 is allowable, as are each of the new dependent Claims 32-51.

For the foregoing reasons, Applicant respectfully submits that each of the pending Claims 1-6 and 41-51 is allowable.

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CONCLUSIONS

In view of the remarks presented above, Applicant submits that the present application is in condition for allowance. As such, the issuance of a Notice of Allowance is therefore respectfully requested. In order to expedite the examination of the present application, the Examiner is encouraged to contact Applicant's undersigned attorney in order to resolve any remaining issues.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,

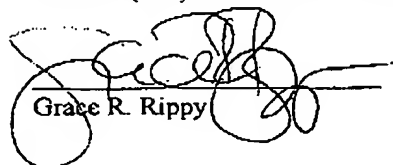


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Grace R. Rippey

December 19, 2005
Date

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